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The CENTRE

Food Processing Development Centre

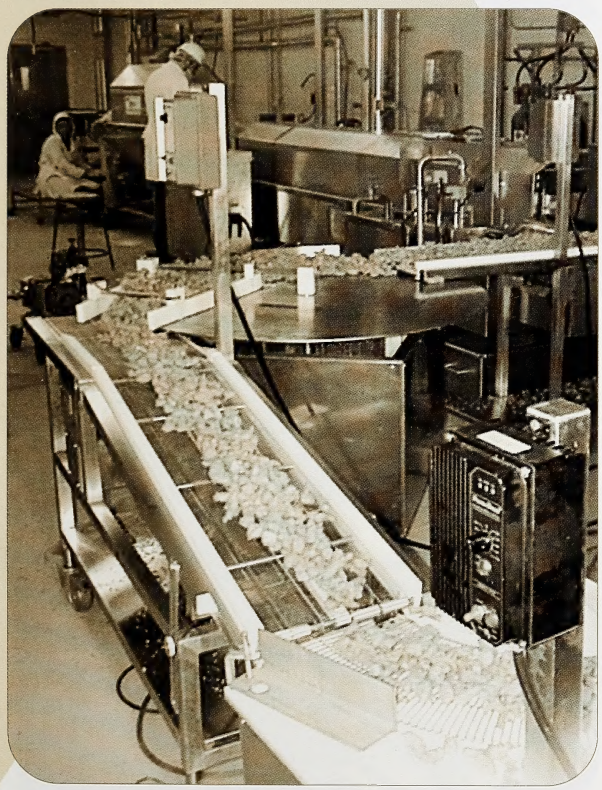
June 2001

Our Equipment: How We Do It

The Food Processing Development Centre is capable of assisting clients with the development and processing of a wide variety of food and non food products from agricultural sources. An extensive array of equipment is maintained at the Centre to meet client needs.

Over the next few issues our newsletter will feature the equipment at the Food Processing Development Centre to give an insight into how we carry out the work we do.

In this issue, have a look at some of the equipment used for development and processing of meat products.



MEAT CHUNKS TRAVEL ALONG A CONVEYER FROM THE FRYER TO THE SPIRAL FREEZER

EXPANSION CONSTRUCTION

UPDATE ... WE'RE EXPANDING

Last year, our branch head, Ron Pettitt, reported on the possibility of an expansion to help us meet the escalating requests from new and existing clients. We've never been busier, and the expansion is now underway. Completion scheduled for August 2001.

The new space will house enlarged cooler and freezer storage, an improved sensory evaluation area, a new bakery/dry processing area, expanded meat processing capabilities, a seminar room, storage and office space. It will allow us to re-organize our existing space for more efficient use. We're all looking forward to completion!

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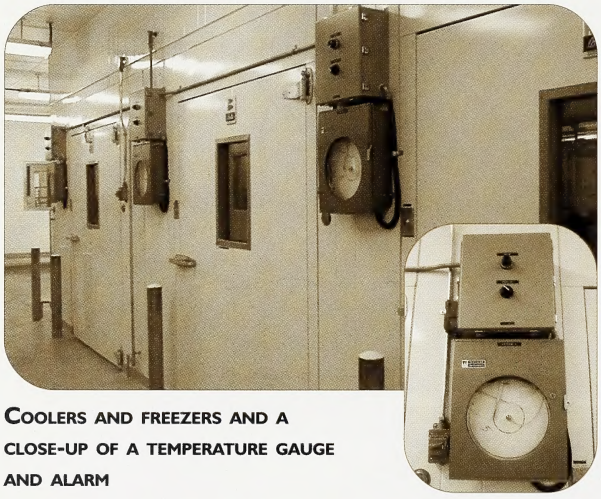
Virtual Tour: FPDC's Meat Processing Room

Meat product development and processing is one of the major programs at the Food Processing Development Centre. We are registered for meat processing under the Canada Food Inspection Agency as Establishment 442 and must comply with all regulations set out by the agency. The significance of this for our clients is that any products processed in our plant can be shipped for domestic or export trade.

The meat room at the Centre is kept at refrigerator temperatures. Raw product must be kept separate from cooked product, so there are separate coolers and freezers in the meat room for each. All of the Centre's coolers and freezers are equipped with temperature monitors and alarms in case the temperature goes above the safe range.



Coolers and freezers and a close-up of a temperature gauge and alarm

Whole-Muscle and Comminuted Processing

One side of the meat room is fitted with equipment used for whole-muscle processing. The other side contains equipment used for comminuted (chopped and processed) meats.

The equipment is mobile and can be moved to where it is needed for setting up an efficient processing line. Sausage production provides a good example of a typical process.

First, the formulation ingredients are weighed on a scale.

At least two alternative methods are available for preparing the meat before stuffing it into casings. The silent cutter can be used to chop and mix the sausage. The silent cutter consists of a large shallow stainless steel bowl, fitted with a series of rotating blades. A clear cover can be lowered into place while the cutter is operating. This allows chopping in a vacuum.

Both the bowl and the blades rotate. The blades are at perpendicular angle to the bowl so that the product is chopped and mixed at the same time. When the sausage ingredients are sufficiently mixed, the silent cutter is emptied by

Silent cutter in action (top) and a view of the blades (left)

lowering the scraper (the round white unit in the photo) that fits exactly into the bowl. As the bowl slowly rotates, the scraper forces the mixture out over the angled spout and into a bin.

Another method for sausage-making is to put the meat through the grinder. Different sized plates can be used to give the desired texture to the sausage.

After grinding, the remaining ingredients must be mixed into the meat. The twin shaft blender/paddle mixer can be used for this step.

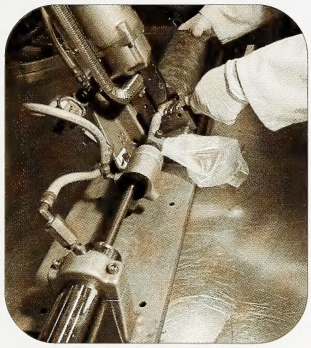
Meat grinder – Seydelmann WD 114 (right)

Twin shaft blender/ paddle mixer (left)

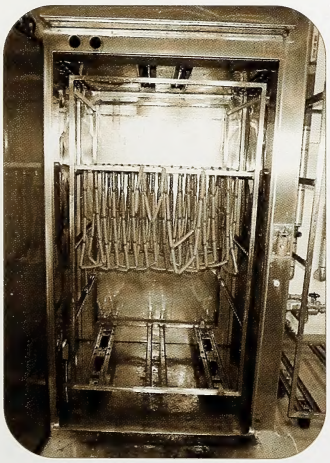
The next processing step is to use the stuffer to stuff the sausage into the casings. Depending on the desired diameter for the sausage, different sized casings are used.

FPDC technologist Henri Vincent using the stuffer

The casing fits over the nozzle. The sausage goes into the hopper atop the stuffer and is forced by rotating vanes into the casing. For small casings, such as weiners, an automatic linking attachment is used to twist the casing. For large casings, the worker twists the end by hand and uses a clipper to seal the ends of the casing with a metal clip.



Clipper

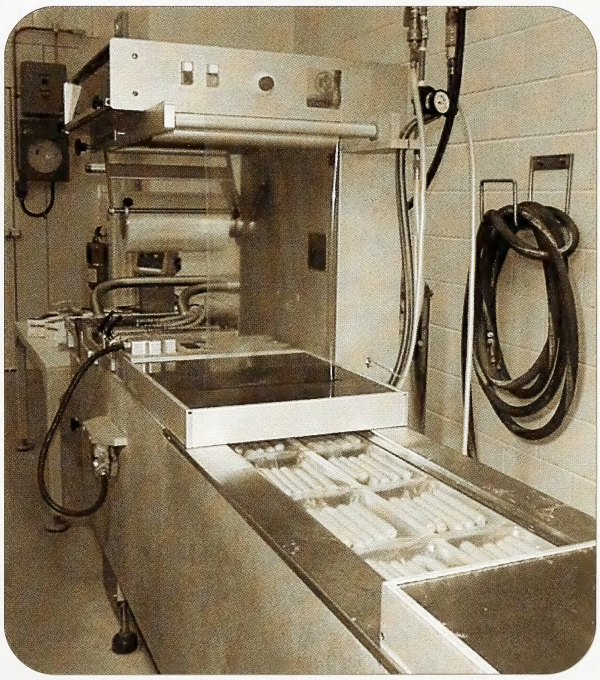


Now the sausage is ready to be smoked. The Centre has a smokehouse with a five-stage programmable cook cycle. It can be used for cooked, cold-smoked or cooked/smoked products. The thick stainless steel door on the smokehouse is fitted with a smoke generator. Beechwood chips are used for the natural smoked flavour.

Maurer Rondair Smokehouse – smoked sausage

Once smoked, the sausage needs to be packaged. In most cases the sausage will be vacuum-packaged in a double-chamber Bizerba vacuum packager. The sausage is packed into plastic bags and placed two or three on each side (chamber) of the Bizerba. The top of the Bizerba is closed firmly over the bags. In a minute or so, the nozzles remove the air from the chamber, creating a vacuum. The bags are then heat-sealed. In the meantime, the next set of bags is readied for the other chamber. When the bags in one chamber are sealed the top of the Bizerba is swung up in an arc and closed firmly over the bags on the other side.

Another packaging option is the larger Multi-Vac Rollstock Packaging Machine. This machine can be used to form a pocket using one of several molds for different shapes and sizes. They can be rectangular, square, round or flat. The product is placed manually into the shaped pocket. Then, the top is laid over and heat-sealed after a vacuum is pulled. The Multi-Vac can also be used to backflush with another gas (usually carbon dioxide) after removing the air from the package.



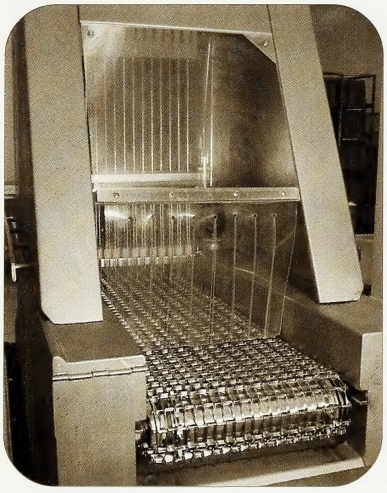
Multi-Vac rollstock packaging machine

Packages are labelled and stacked into boxes bearing the Food Processing Development Centre's establishment number. The product is now ready for market.

Not all meat product development is sausage and not all of the comminuted (chopped) ends up as sausage. Other products include formed jerky, ham, corned beef and other similar processed products.

Whole-Muscle Processing

Whole-muscle processing is just as important to our clients. Whole muscles, such as pork leg or hams are injected with a brine using a **pickle injector**. The brine is pumped into a series of hollow needles that are about two millimetres in diameter. It is through these needles that the brine is injected evenly throughout the muscle.



Fomaco needle stitch pump pickle injector

Following injection, the product is often massaged using a tumble-massager. This piece of equipment consists of a rotating drum that has baffles inside it to move and massage the muscles. The Centre has four different sizes. The largest tumbler resembles a small cement mixer. The smallest is about the size of a horizantal congo drum.

Tumble-massager

After being tenderized and/or mixed with marinade, the meat can be cooked in an infinite number of ways.

For example, pot roasts can be cooked dozens at a time in our 600 L Hamilton Pressure Kettle. A large basket, fitted with wire shelves, is lowered into and removed from the kettle using a hydralic lift. When the meat is removed from the kettle it will be quickly cooled, then packaged.

Hamilton 600-L pressure kettle

Removing roasts from the basket of the Hamilton – note the loop on the crossbar, this is where the hydraulic lift hooks in to remove the basket from the kettle

The Centre's fryline is often used for processing meats. In a typical process, the Koppens Former is used to punch pieces of meat into various shapes.

The next step is having the shaped pieces of meat coated with breading or batter. Then they are deep fried, frozen immediately in the spiral freezer and packaged (see photo on page 1).

For processing a stew type product, the paddle mixer is ideal. Although this piece of equipment is used to mix sausage ingredients, it can also be used to cook. It's a rectangular vessel with two horizontal stirring paddles inside. When closed, the lid forms a seal for vacuum for cooking. To empty the mixer, the two portholes at the lower front are opened and the paddles are slowly turned to force the cooked product out. This makes it ideal for thick mixtures.

There's More!

This has been just a glimpse – featuring only a fraction of the Centre's meat-processing equipment. In the next issue, we'll have a look at the equipment used for another of the Centre programs.

Preventive Maintenance Program

At the Food Processing Development Centre there is an extensive inventory of equipment. Some of it is used almost daily. Other pieces are used only occasionally. Either extreme can create its own type of maintenance problems. Despite the different usage schedules, the Centre needs to keep all of its equipment in top working order so it's ready when it's needed. That's the task Jimmy Yao (Centre engineer) and Dave Forster (Centre millwright) have set for themselves.

Yao has created a computer database for each piece of equipment. Yao and Forster are also setting up a preventive maintenance schedule for each piece, tailored to the amount of use it gets. The process involves checking the equipment to make sure it works, cleaning, lubricating, noting any potential trouble spots and recording the information.

"We are trying to reduce the time we spend doing emergency repairs because it's very frustrating and expensive to have down time for some of our more complicated pieces," says Yao.

Forster stays on top of the maintenance schedule. "So far, in the past year, I've completed the preventive maintenance on about half of the 300 or so pieces of equipment on our list. This is a new program for us, so it's going to be a few more months before we catch up with everything," says Forster.

Yao and Forster have also implemented a system to record the repairs made to each piece of equipment. If anything needs repair, staff members complete a work order form.

"I'm still trying to train everyone to fill out the work order and write down what the problem is," Forster says. "That way Jimmy and I don't have to guess why the equipment just appears in the shop."

When the work is completed, an electronic record is kept.

"This process gives us an up-to-date record for all the repairs we do on any specific piece of equipment and it elimintates the guesswork the next time there's a problem," explains Forster.

Both staff and clients have really noticed some improvements. For starters, the ongoing attention means that equipment is now ready to use each time it's needed. Another improvement is that Forster's inspections sometimes reveal that improper use of machinery has caused problems. Often Forster can prevent the need for future repairs by alerting the users about correct assembly or start-up. If someone suggests a modification that makes a machine safer or more efficient, Yao and Forster will check out the implications. If the modification doesn't compromise the machinery, they'll implement the change.

"Preventive maintenance leads to increased efficiency and better use of our resources," notes Yao. "That's everyone's goal."

Calibration

A large part of the work done at the Food Processing Development Centre depends on measurements; weights, temperatures and instrument readings.

Yao makes sure that all the equipment is calibrated correctly so that the readings are accurate.

"When we receive a new piece of equipment or if we're doing a preventive maintenance check, I start with a calibration," he says.

Yao notes that temperature is the most important for the people working at the Food Processing Development Centre.

"Reaching the correct processing temperature is one of the critical control points for food safety. The temperature readings on our smokehouse, pasteurizer, pressure kettle, retort and similar pieces have to be accurate."

Yao uses a Fluke Documenting Process Calibrating Instrument for this purpose. It's a sophisticated device that is equipped with standardized factory settings for temperature, pressure and several other measurements.

Yao connects the instrument he's testing to a specific port on the Fluke.

"The calibrator is especially good for debugging because I can simulate and measure different signals, depending on the type of sensor," says Yao.

For instance, the temperature can be read directly or as a voltage signal. This means Yao can determine the source of a problem on an instrument by connecting the Fluke to the various parts of the instrument. If he checks a temperature probe and gets an accurate temperature reading, he can also go on to test the accuracy of the gauge by checking the voltage. He keeps checking until he pinpoints the problem. Then he can make the necessary adjustments so the instrument gives accurate readings.

Yao checks pressure readings by using a pressure-module attachment for the Fluke. He then goes through a similar process.

"Accuracy is essential for our HACCP plan and the first control point is calibrating our equipment," says Yao.

focus on

ALLAN HAYMAN

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"Make sure it gets signed!"

Allan Hayman wants a signed production record for each and every production process carried out in the Centre's plant.

This is important to Hayman, the Centre's quality assurance supervisor, because it's his job to make sure that safe production is a priority at every stage of each process.

Hayman joined the Food Processing Development Centre in May 1996. His career highlights include 10 years in the brewing business and 23 years working at Alberta Agriculture, Food and Rural Development to attract new agri-food processors to Alberta.

Hayman has also worked with Alberta processors who were looking at new processes or the expansion of existing processing lines. He has worked extensively with the Alberta food processing industry and has a good understanding of the wide range of processing that's being done in Alberta.

Now, Hayman works with the Centre's staff and clients to help develop quality assurance and Hazard Analysis Critical Control Point (HACCP) programs for production being done at the Centre.

"HACCP is indispensable for food processors today," says Hayman. "A HACCP program involves identifying all points in your process where a problem might occur. Then, you must establish how you're going to control the risk at those points so as to ensure the safety and quality of your product."

ALLAN HAYMAN

For instance, all shipments of raw material to the Centre are checked. If anything doesn't look right, the delivery is refused. If the product should be refrigerated, Hayman or a technologist checks the temperature at delivery and records it. That is the beginning of the record keeping process, a conerstone of a HACCP program.

"We're always checking and documenting temperatures, water activity levels, equipment condition and so on," Hayman says. "When you have a written record for each production run showing that each safety factor was okay, you have good quality assurance. And make sure the production record gets signed. Then, if there's a problem, you know who to ask about it."

Hayman notes that the Centre has many client companies who use the facilities and bring in their own employees.

"It's really important for us to be an exemplary model of high standards if we expect our clients to develop good HACCP plans," Hayman explains. "That includes personal safety, minimizing contamination in the production areas and establishing production records right from the delivery of raw materials to recording formulation weights for every batch and shipping out packaged product.

Hayman has established a number of policies that make it easier to achieve the high safety and quality standards maintained at the Centre.

"All of our clients are given an orientation package that outlines our safety procedures and what the standards for employees are in terms of proper attire and sanitation. We've always provided that, but part of our assurance program now includes written assurance that the clients have read the guidelines and understand them," says Hayman.

Another important part of quality assurance involves the correct use of equipment. "If the machines aren't in proper working order or the employees don't operate the equipment correctly, we could have some serious problems," Hayman says.

For those reasons, Hayman works closely with both the Centre's engineer and millwright to implement a preventive maintenance program. The Centre now uses metal detectors on all product produced on site.

"We have many clients and there's a lot of interest in what we do at the Centre. That's good, but I'm fairly strict about tours," says Hayman, who monitors the requests for tours and co-ordinates and escorts many of the visits.

"For food safety reasons tours are now restricted to potential clients and investors," says Hayman. "And everyone must wear proper attire -- a hairnet, a beard net, a hard hat and a lab coat."

Hayman has also introduced the use of shoe covers for every visitor. This minimizes the tracking of outside contamination into the plant. He even asks about a tour group's itinerary and will re-arrange the tour time if he feels it eliminates the chance of contamination from any other site. Due to expansion construction, tours of the Centre have been put on hold until after August 2001.

In addition to his duties in quality assurance, Hayman is also responsible for the computer needs at the Centre. When servers go down, printers don't work, someone needs a program loaded or we need to get a technician in to do some work, Hayman is the one who sorts out the problem.

"There's never a dull moment," he says.

We'd all agree with that!